

ZMAX-8210 Series

(ZMAX-8210-I/ZMAX-8210-E)

User's Manual

V2.0.6.0

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About This Manual

This manual explains Z-Com outdoor ZMAX-8210 Customer Premise Equipment (CPE), how to build the infrastructure centered on the ZMAX-8210 and proposals when using this CPE.

✎ **Note:**

- This indicates an important Note.

Warning:

- Cautions are given to prevent any damage to the ZMAX-8210, data lose or badly-behaved operations.

Bold: Indicates the function, important words, and so on.

Content

Figure

Table

Chapter 1 Introduction

Introduction

Thank you for choosing the ZMAX-8210 Series Customer Premise Equipment (hereafter called CPE). Compliant with the innovative IEEE802.16-2004 and working at the licensed 3.5GHz with efficient modulation, this outdoor CPE gives wireless ISP providers today's fastest pathway to new markets and revenue. whether well-established and looking to expand, or smaller and newly established – service providers of all types can immediately and cost-effectively create wireless networks even in most challenging environments or reach out from established network to capture new customers. Without the delays and costs of leasing or building a wired infrastructure, ZMAX-8210 is capable of providing secure and reliable access to high-speed data, voice and video services. ZMAX-8210-I build in 16dBi gain antenna, ZMAX-8210-E with N-Female connector for external antenna. Typically, 802.11s Mesh implemented in this device will free physical limitation that a block stands in the way in the infrastructure could lead to failure of communication), finding a key to "the last mile".

Appearance



Figure 1 ZMAX-8210

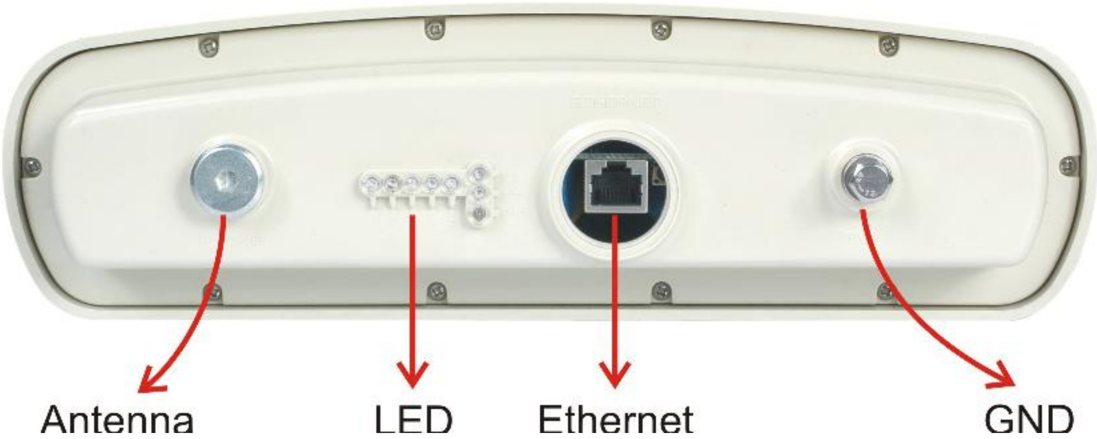


Figure 2 ZMAX-8210 ports

The ZMAX-8210 appearance is designed to be water-proof and dust-proof for most challenging environments outdoors.

Key Features

- The ZMAX-8210 provides you with the solid features.
- Power supply via POE
- Based on WiMAX together with compliant with 802.16d-2004
- Work at 3.5GHz
- Implement Orthogonal Frequency Division Multiplexing (OFDM）and Non-Line-of-Sight (NLOS)
- Efficient Modulation
- Water, dust-proof and built-in antenna for outdoor environments
- User-friendly web-based management

Build Typical Infrastructure

The versatile ZMAX-8210 greatly livens up the internet for your various needs. Typically Point-to-Point, Point-to-Multipoint modes are mostly recommended infrastructures.

- Wireless Point-to-Point Outdoors

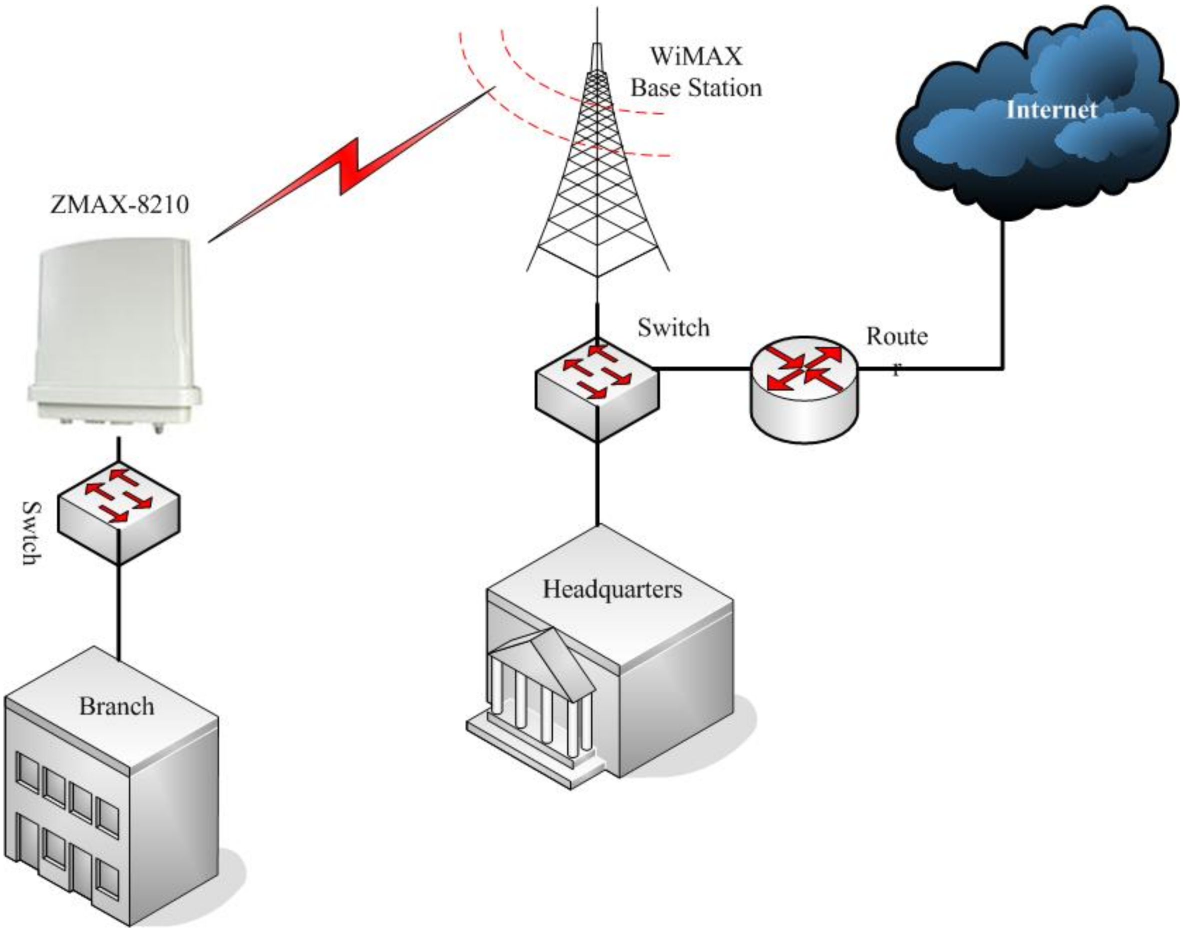


Figure 3 Wireless Point-to-Point Outdoors

Under this structure, the ZMAX-8210 acts as a customer premise equipment (CPE), connecting a WiMAX Base Station.

- Wireless Point-to-multipoint Outdoors

Under this structure, acting as a customer premise equipment, the ZMAX-8210 is connected to the WiMAX Base Station, allowing ISP to cost-effectively build infrastructure in a matter of hours.

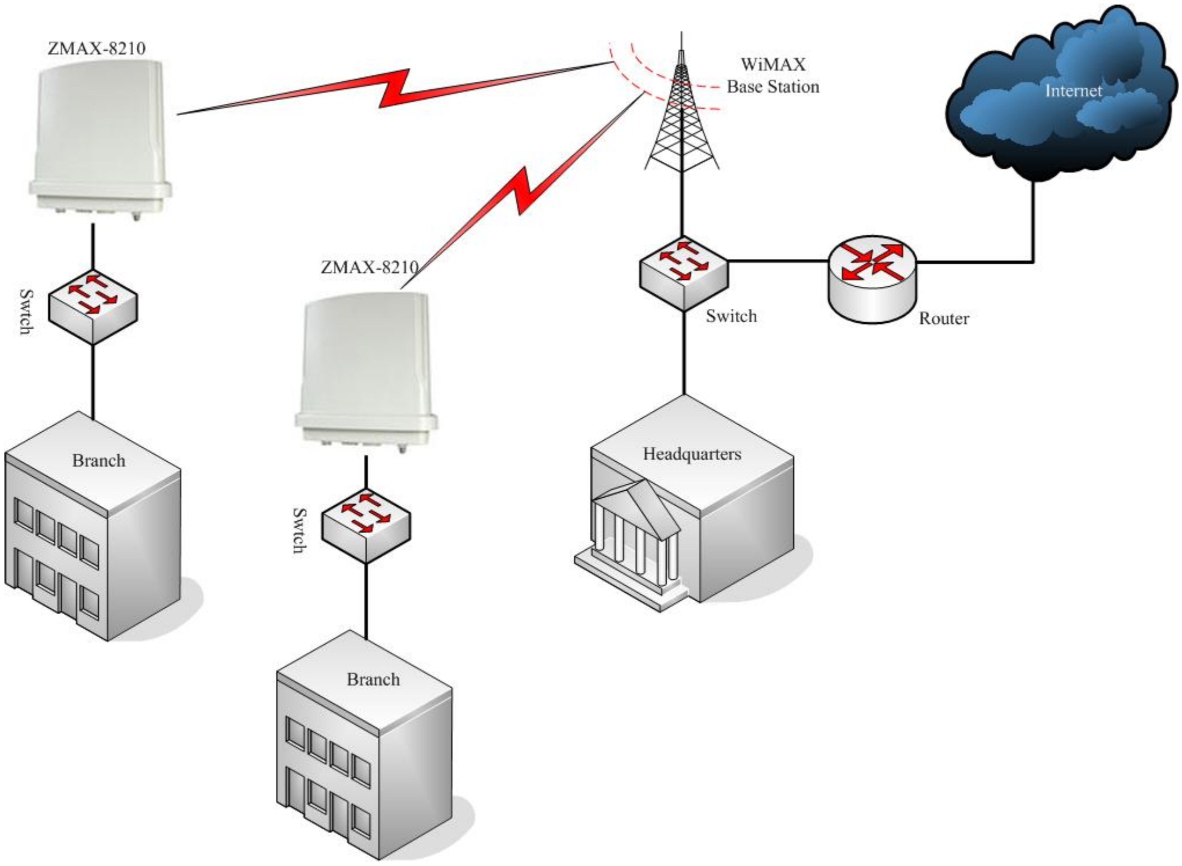


Figure 4 Wireless Point-to-multipoint Outdoors

Typical Case

The high-quality performance enables the ZMAX-8210 to gain widespread acknowledgements. It is able to undertake tasks in various situations.

- Create or expand well-created network via this CPE in enterprises or residential quarters
- Provide an access to Metropolitan Area Network via WLAN
- Act as a media connecting Base Station and sub-stations in mobile communicating network
- Provide an access to hard-to-reach areas, like ancient sites
- Cost-effectively build in most challenging environments, like remote mountain areas and rough sites via this CPE
- Build a makeshift network for a meeting
- Link Backup or Emergency Communication

Chapter 2 Basic Installation

System Requirement

Before installing the ZMAX-8210 Customer Premise Equipment, make sure your system meets these requirements

- A PC coupled with 10/ 100Base-TX adapter
- Configure the computer with a static IP address of 192.168.1.x (x cannot be 1) and 255.255.255.0 for the Subnet Mask
- A Web browser for configuration such as Microsoft Internet Explorer 6.0 or above, or Netscape Navigator 4.78 or above or Firefox

Package Content

If any missing or damaged, please contact your local seller.

- Z-Com ZMAX-8210 Customer Premise Equipment
- Power adapter and cord （48V，1A）
- Accessories (For its full contents, please refer to accessory installation guide)
- ZMAX-8210 Customer Premise Equipment Installation Guide

Hardware Installation

Follow the steps below to install your ZMAX-8210. (the different of hardware installation between ZMAX-8210-I and ZMAX-8210-E is antenna)

- Make sure all components linked to the ZMAX-8210 are on hand.



- A brace fixed on the back of the ZMAX-8210 is tabled on a perfect area like well-sized desk.
- Attach one end of water-proof cable to a water-proof connector. Alternatively, you can make a Category 5 UTP straight yourself.



- Connect the other end of the Ethernet cable to the ZMAX-8210.



- Tighten the water-proof connector.



- A ground wire connects the ZMAX-8210.



Note:

- To keep the ZMAX-8210 antenna intact, a plastic coat is over the antenna. Remove the coat wile using it.

Warning:

- Be sure to your ZMAX-8210 is connected the ground wire, preventing something unexpected.

Antenna Installation

16dBi built-in antenna is placed in the ZMAX-8210, so you need not install antenna.

The ZMAX-8210-E needs an external antenna. You should choose your antenna as your need.

Warning：

- Keep your ZMAX-8210 associated with the antenna away from power line, lamp, electrified wire fence or anything others electrified.
- Though a thunder-proof component is built in, it is recommended that additional thunder-proof device is needed for effectively protecting your ZMAX-8210.

Chapter 3 Basic Settings

Default Factory Settings

We'll elaborate the ZMAX-8210 default factory settings. You can re-acquire these parameters by resort button. If necessary, please refer to the "the way to restore default factory settings.

Table 1 ZMAX-8210 Default Factory Settings

Feature	Factory Default Settings
User Name	admin
Password	password
Device Name	Devicexxxxxx（xxxxxx represents the last 6 digits of MAC address）
Spanning Tree Protocol	Enable
IP Settings	IP Type：STATIC
	IP Address：192.168.1.1
	Subnet Mask：255.255.255.0
	Default Gateway：0.0.0.0
	Primary/Second DNS Server：0.0.0.0
HTTP Redirect	Disable
Wireless Settings	Base Station ID：01020304050D
	Dual-Direction Voice：TDD
	Bandwidth：7MHz
	Encryption：Disable
	IR Bit: 0
SSH	Disable
SNMP	SNMP：Enable
	Trap Server：192.168.0.254
	Read Community：public
	Write Community：private

How to Login Your ZMAX-8210 via WEB Browser

ZMAX -8210 provides you with user-friendly web-based management. Take the following steps

- Enter the ZMAX-8210 via IE. When entering the IP address: **http://192.168.1.1**, you'll see a popup menu below:



Figure 5 Safety Alert

- Clicking "Yes" ushers you into the login.



Figure 6 Login

Note:

- Make sure the PC IP address need to be matched the device. For instance, the ZMAX-8210 is 192.168.1.1, and your PC IP should be 192.168.1. X.

Enter the default name "admin" in the username field and "password" in the password field。Clicking " Login now " will usher you into the ZMAX-8210 management interface.

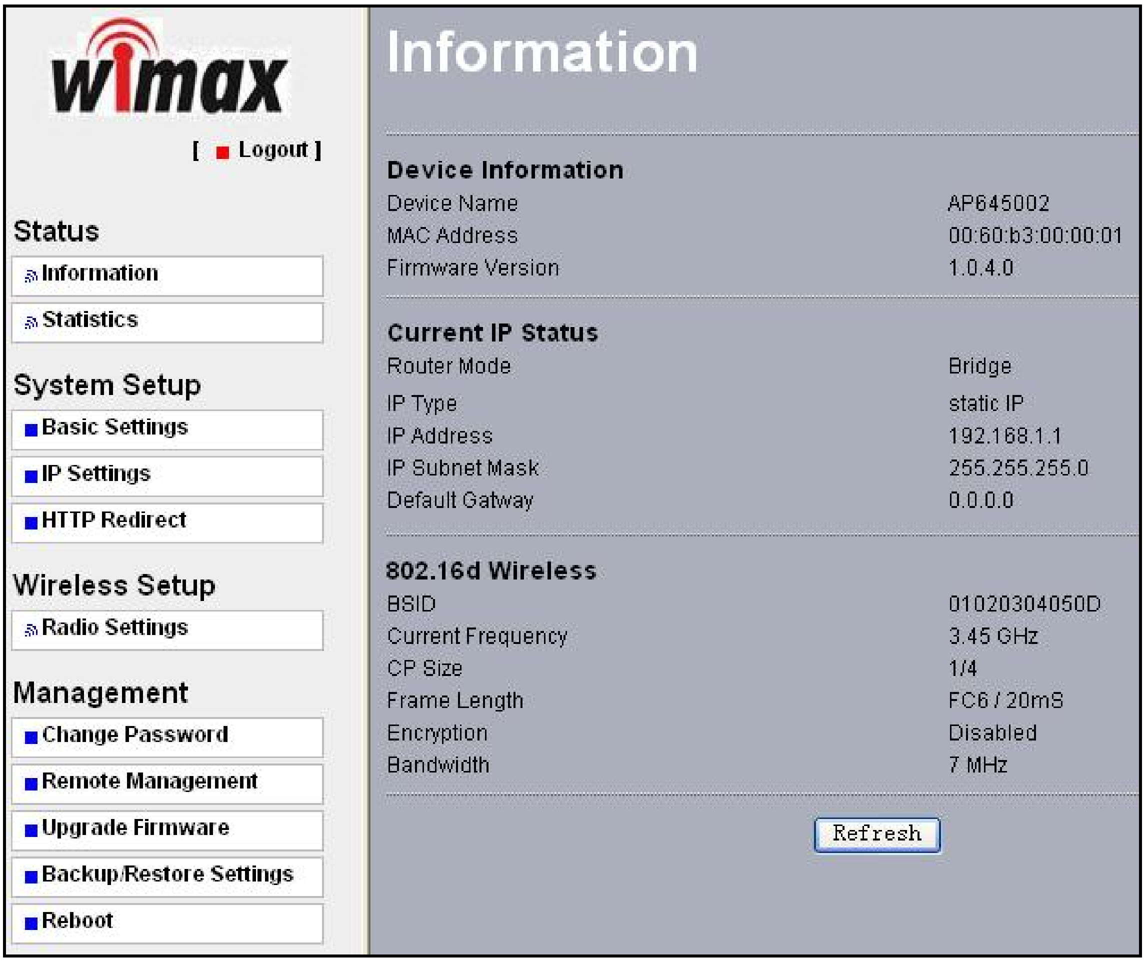


Figure 7 ZMAX-8210 General Information

Device Name

Clicking“Basic Settings”, you'll see the ZMAX-8210Name. You may assign any device name to this CPE. This name is only used by the CPE administrator for identification purposes. Unique, memorable names are helpful, especially if you are employing multiple access points on the same network. This name is composed of 15 characters with 0-9, A-Z, a-z or "-".

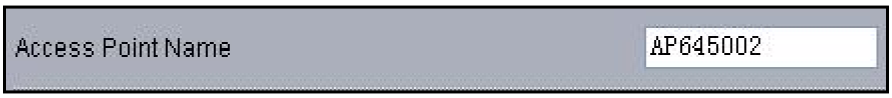


Figure 8 ZMAX-8210 CPE Name

"WINS" enabled, you have the alternative of entering management page by entering the Device name instead of painfully writing out IP Address. For example, you can specify the name as “device030201”. So entering“device030201” will lead you to the management site. Also, Ping device030201 helps you check whether WINS can take effective in the ZMAX-8210.

✎ **Note:**

- By default, the ZMAX-8210 CPE is Devicexxxxxx(xxxxxx represents the last 6 digits of MAC address).
- No figure is allowed to represent initial.
- When WINS undertakes interpreting, make sure the PC IP address need to be matched the CPE. For instance, the ZMAX-8210 is 192.168.1.1, and your PC IP should be 192.168.1. X.

Bridge and Router Mode

The ZMAX-8210 is capable of working under bridge and router modes.

- Opening “IP Settings” will navigate you to the configuring mode page.

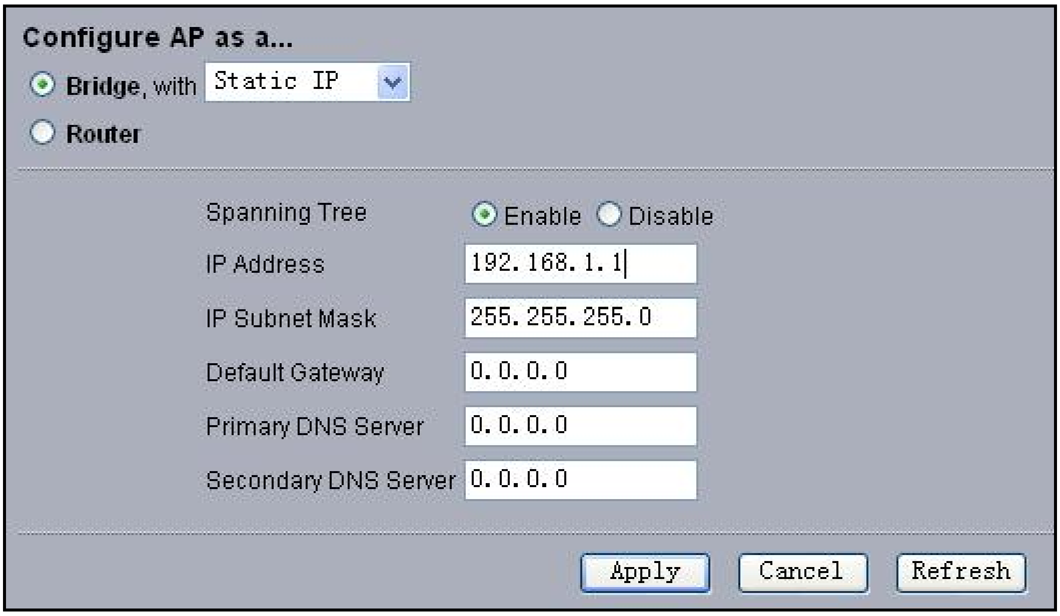


Figure 9 Configure the ZMAX-8210 to Bridge

- The ZMAX-8210 provides bridge and router modes. Under the bridge mode, you are required to set IP Address, Subnet Mask, Default Gateway and Primary (Second) DNS Server. For Router mode, refer to “**Set Router Mode”.**

IP Address

The ZMAX-8210 provides two options of obtaining IP addresses, static IP address and dynamic address from DHCP Server.

- STATIC：Manually set the ZMAX-8210 IP address subnet Mask, Default Gateway and Primary (Second) DNS Server. 255.255.255.0 is usually taken as the subnet mask.
- DHCP Client：Alternatively, the ZMAX-8210 can obtain IP address subnet Mask, Default Gateway and Primary (Second) DNS Server from DHCP Server.

Note：

- If you fail to obtain IP address for the ZMAX-8210, the CPE will turn to the client address for use.

Wireless Parameters

Opening "Radio Settings can lead you to the ZMAX-8210 wireless parameters. You can set what you desire.

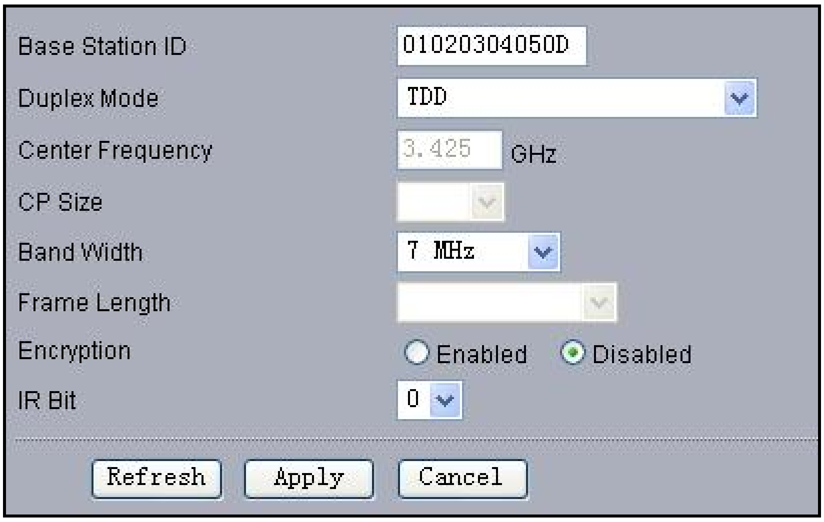


Figure 10 ZMAX-8210 Wireless Parameters

- Base Station ID: This field allows you to enter the Base Station ID you want to connect, to establish a tie between this CPE and the Base Station.
- Duplex Mode: This field allows you to have the options of TDD and HFDD modes.

Note:

- Under the Duplex Mode, you are required to keep the consistency in setting between the ZMAX-8210 and the Base station.

- Center Frequency: This field helps you to scan the center frequency that the linked device performs and shows the frequency in this field.
- CP Size: This field displays the ratio of hardware MTU (maximum transmission unit) before rotating this device.
- Bandwidth: This field provides the bandwidth when this device is undertaking tasks. You can get two options-- 3.5MHz and7MHz.

Note:

- The bandwidth shall be in the complete accord between the ZMAX-8210 and the Base Station connected.

- Frame Length: This field displays the frame length that the ZMAX-8210 can obtain from other

devices.

- Encryption：This field provides encryption options.

Note：

- When the communication is established, the encryption shall be completely identical between the ZMAX-8210 and the Base Station,

- IR Bit：This field identifies whether forward “initial ranging data”。

Note：

- There shall be in complete accord in the parameters between IR Bit and Base Station.

Create a Link between the ZMAX-8210 and WiMAX Base Station

Acting as a customer premise equipment (CPE), the ZMAX-8210 aims at establish a tie with WiMAX Base Station to enable IP network to be connected to main arteries. We’ll elaborate how to build the infrastructure via the ZMAX-8210. The CPE has access to connect to the WiMAX Base Station via the Base Station ID. However, the Duplex Mode, Bandwidth and IR Bit shall conform to the requirements set when creating a link between the ZMAX-8210 and the Base Station.

Take the following steps to build your infrastructure.

- Connect this CPE to PC via a cable. And assign 192.168.1.100 as your PC IP Address.

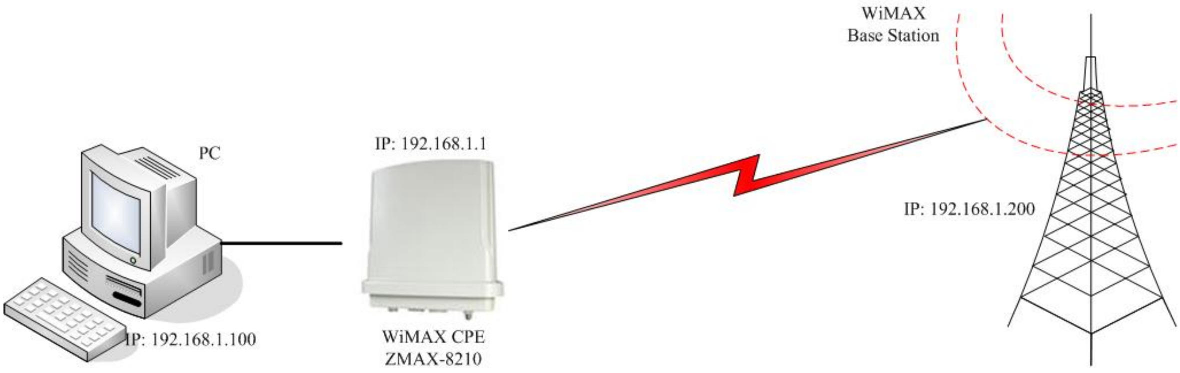


Figure 11 Build the Infrastructure with WiMAX Base Station

- Enter the ZMAX-8210 web-based management. And set proper parameters in the “Base Station ID”, “Duplex Mode”,“Bandwidth”,“Encryption”and“IR Bit” fields, respectively to establish a link between your CPE and the WiMAX Base Station.

Note：

- The parameters set in the ZMAX-8210 shall match the ones in the WiMAX Base Station, when the tie is established.

- Using "ping" to check whether the communication is sound. Take an example as follows.
  - Ping 192.168.1.1 to check the communication between the ZMAX-8210 and PC.
  - 192.168.1.200 check the communication between the ZMAX-8210 and WiMAX Base Station.
  - If you fail to ping, please see **Troubleshooting**.

Chapter 4 Advanced Configuration

Router Mode

The ZMAX-8210 is able to carry out router function.

- Opening “IP Settings” navigates you to router mode interface.

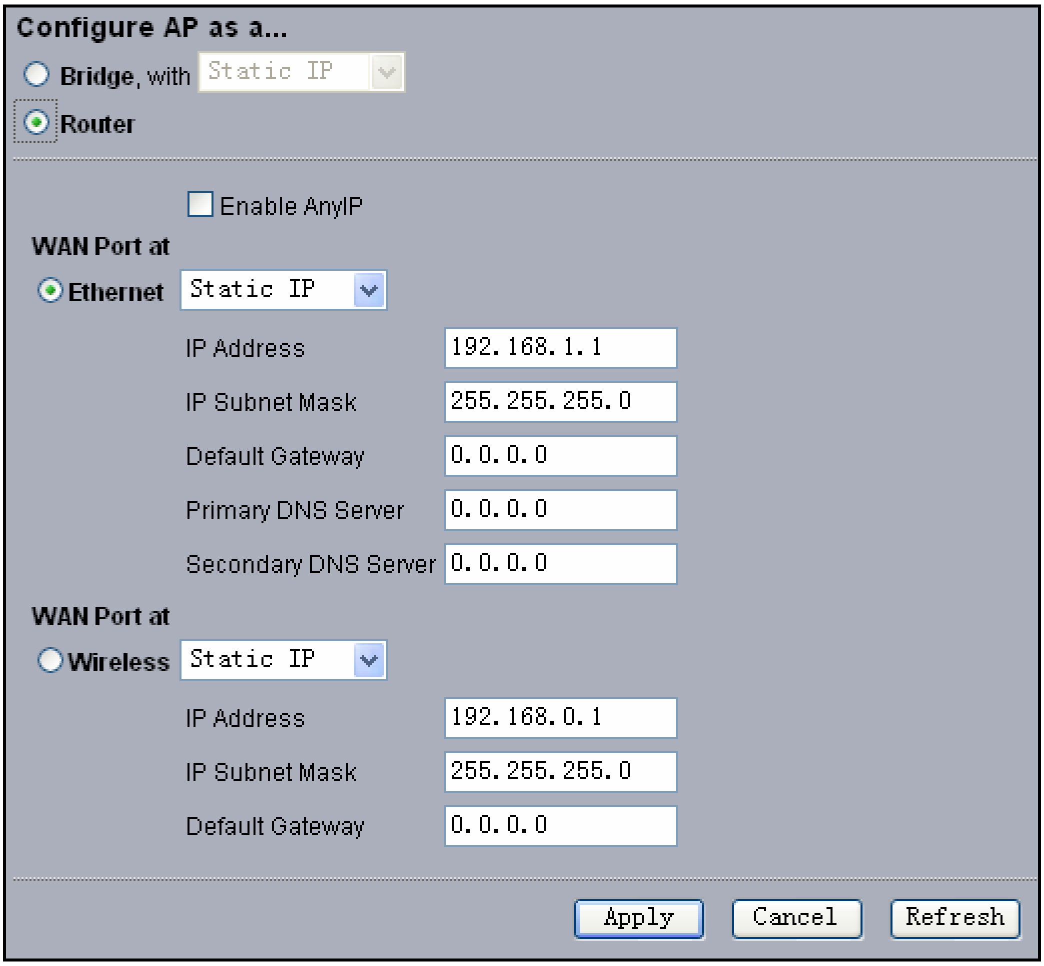


Figure 12 ZMAX-8210 Router Mode Settings

- You can set proper IP addresses for WAN and LAN. Refer to the following infrastructure.

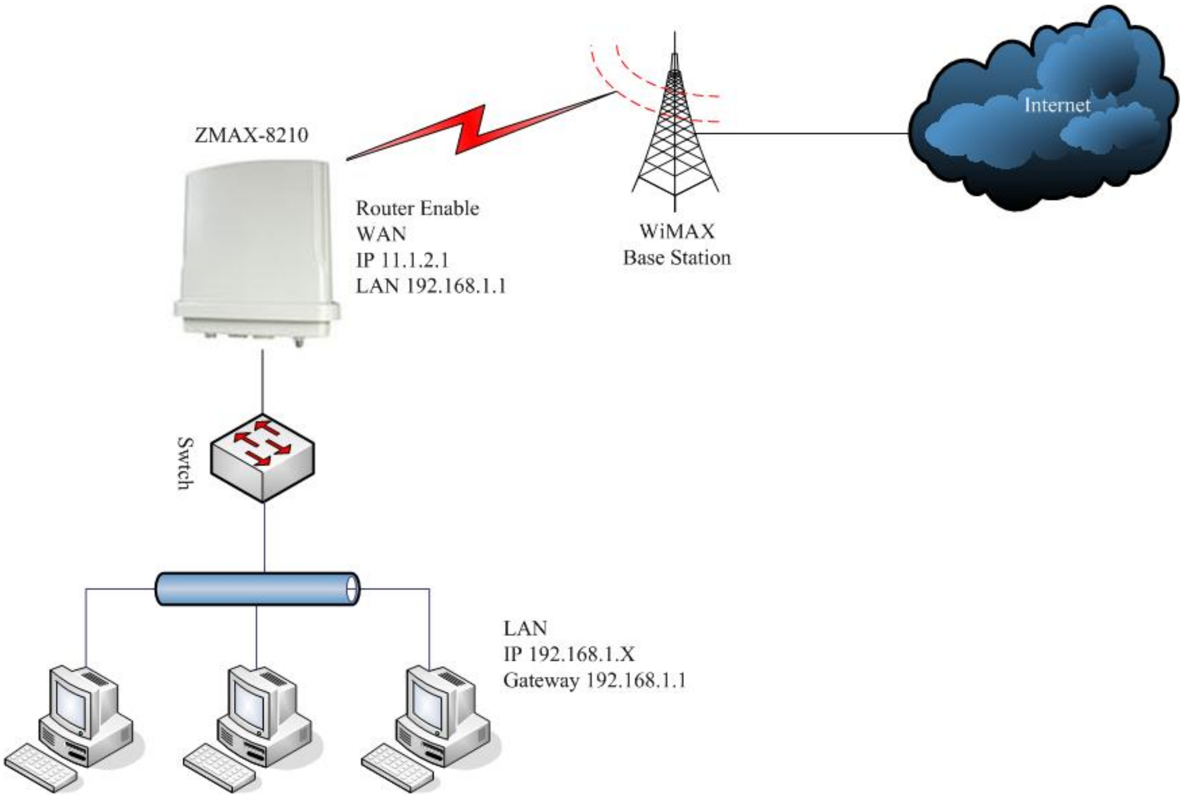


Figure 13 Wireless Router Mode

Any IP

Under the router mode, the ZMAX-8210 provides Any IP，enabling you to enter whatever IP addresses legally or illegally so as to carry out various tasks, relieving your trouble of memorizing IP address.

Take the steps below.

- From the "IP Settings"，Choose "Router" and enable "Enable Any IP".

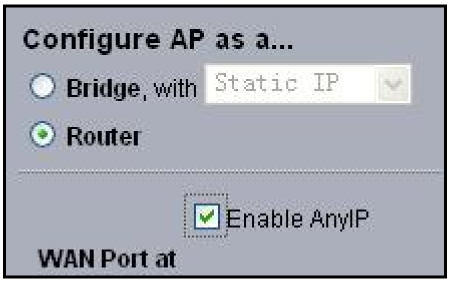


Figure 14 Any IP

Note:

- You can assign whatever IP Address, however the default gateway and DNS shall be set.
- A legal IP means access to the internet is available via this IP Address.

DHCP Server

Under the router mode, the ZMAX-8210 can also serve as a DHCP server, responsible for assigning IP addresses to the devices connected to the infrastructure.

- From the“IP Settings”choose“Router”. The way to assign IP Address turns “Static IP to “DHCP Server” . Clicking “Apply” to enable “DHCP Server”.

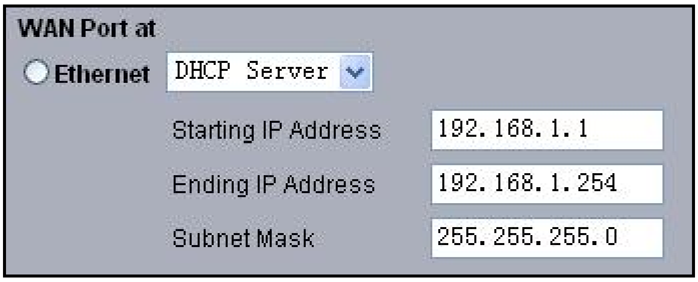


Figure 15 DHCP server

✎ **Note:**

- The IP Address number that the “DHCP Server” generates shall be no less than the ones in clients

Time Server

Compliant with NTP, the ZMAX-8210 is capable of keep its time in complete accord with the internet time.

- Opening “Basic Settings” guides you to the time setup.

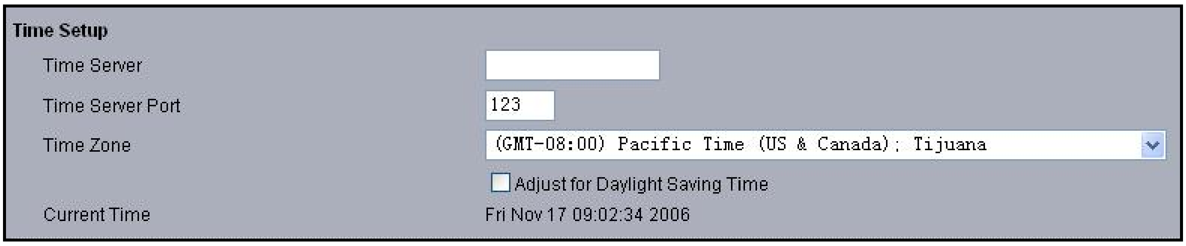


Figure 16 Time Server

- Time Server Setup:
  - Assign the proper IP address to the ZMAX-8210, ensuring this CPE to have access to the internet. For information on setting proper address, refer to **IP Address**.
  - From the “Time Server”, enter the correct time server. The following provides the time server website.

  a) time.windows.com

  b) time-a.nist.gov

  c) time.nist.gov

  - From the “Time Server” pop-menu, select your time zone.

- From the “Adjust for Daylight Saving Time”, you have the option of daylight saving time or not. Finally, clicking “Apply” to complete your time server settings.

Note:

- It is only when the ZMAX-8210 have access to the internet that the time server can take effect.

HTTP Redirect

Enabled HTTP Redirect and enter the IP address that the HTTP Redirect specifies. On such condition, when other devices attempts to login the internet for browning web via the ZMAX-8210, the first page in view is forced to what the specified IP address shows.

Typical HTTP Redirect Case:

- Assign a proper IP address to the ZMAX-8210, ensuring an access to the internet. Connected to this CPE via a switch, PC1, PC2 and PC3 have access to the internet.

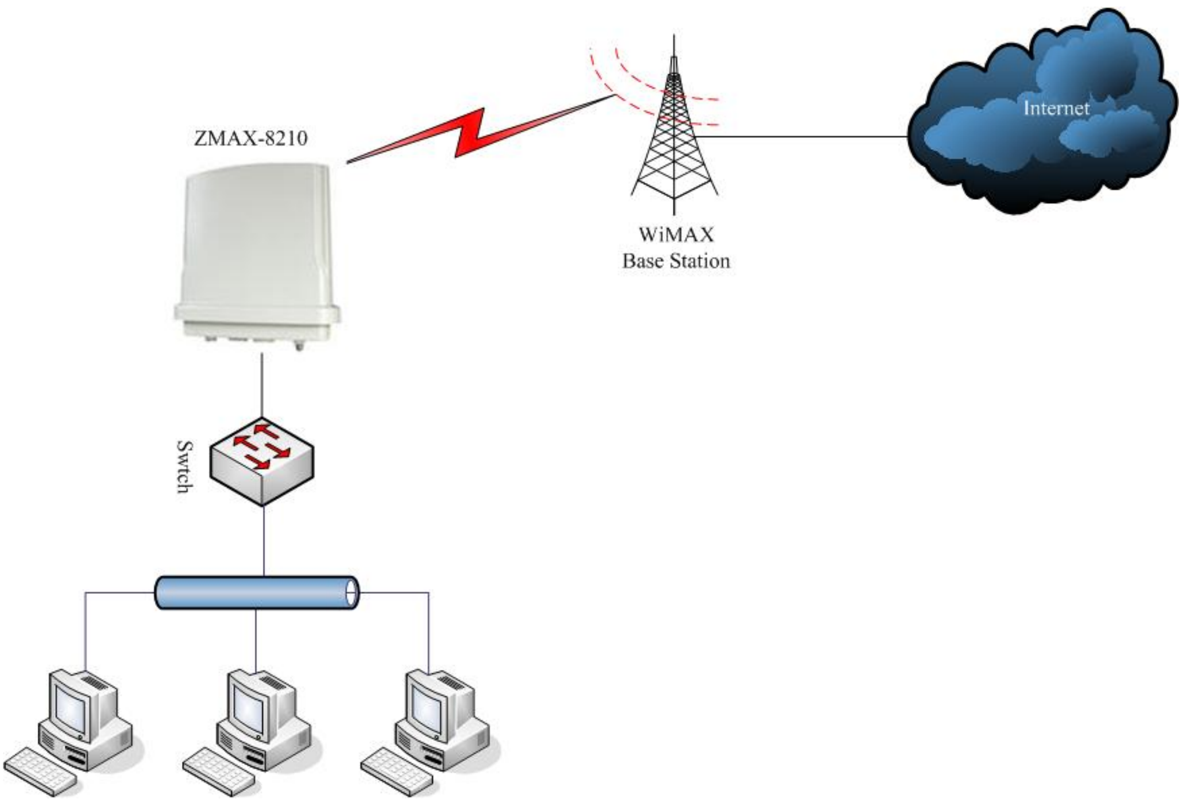


Figure 17 Typical HTTP Redirect Case

- Open “HTTP Redirect” and enable HTTP Redirect. Enter an imposed. IP Address For example, IP Address.http://www.zcom.com.tw.



Figure 18 HTTP Redirect

- From PC1，PC2 or PC3, you want to login the internet-- http://www.sohu.com，but the web browsers will turn to http://www.zcom.com.tw；If from the PCs to browse http://www.sohu.com anew, this time you'll see the exact page.

✎ **Note：**

- Make sure there is an access from the ZMAX-8210 to the internet, before enabling HTTP Redirect.
- HTTP Redirect will take effect every two hours. Therefore, from the client, you'll see the forced page instead of your designed.

Chapter 5 Management

View the ZMAX-8210 Basic Information

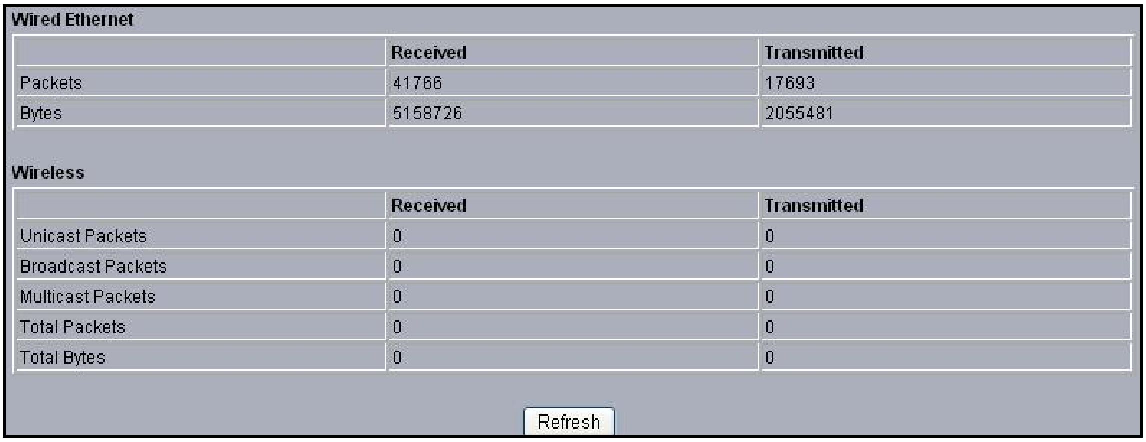
From the "Information", the ZMAX-8210 provides the basic information about this CPE. All is read-only. For the detailed information, refer to **Basic Settings** and **Advanced Configuration**.。



Figure 19 Basic Information

View Statistics Information

From the "Statistics", the ZMAX-8210 provides information about sending or receiving packets out of both the Ethernet and wireless ports. Clicking "Refresh" allows you to view the real-time information linked to the ZMAX-8210. All is read-only.



Wired Ethernet

	Received	Transmitted
Packets	41766	17693
Bytes	5158726	2055481

Wireless

	Received	Transmitted
Unicast Packets	0	0
Broadcast Packets	0	0
Multicast Packets	0	0
Total Packets	0	0
Total Bytes	0	0

Refresh

Figure 20 ZMAX-8210 Statistics Information

- The Ethernet port provides the packet information from the Ethernet port.
- The wireless port provides the packets information from the wireless port.

Password

You can change password to managing your ZMAX-8210.

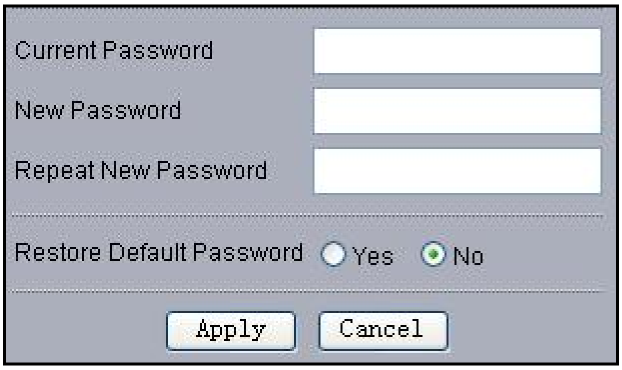


Figure 21 Password Change

- The length of password is no more than 19 characters. You can restore the default password by enabling “Restore Default Password”.

Upgrade Firmware

The ZMAX-8210 provides two ways to upgrade firmware.

- Upgrade Firmware via Web



Figure 22 Upgrade Firmware via web

- Open“Upgrade Firmware”;
- Click“Browse” to select your wanted file for upgrade.

- Click“Upload” to enable the file to be loaded to your ZMAX-8210.
- Reboot your ZMAX-8210 and check whether the firmware has been upgraded in the Basic Information.

- Upgrade firmware via FTP
  - Enter the command ftp 192.168.1.1，admin and password.
  - After successful commanding, enter“put mercury.rmt”. If the upgrade is successful, the information will be shown as below.

```
C:\>ftp 192.168.1.1
Connected to 192.168.1.1.
220 (vsFTPd 1.1.3)
User (192.168.1.1:(none)): admin
331 Please specify the password.
Password:
230 Using binary mode to transfer files. Login successful. Have fun.
ftp> put mercury.rmt
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
ftp: 发送 4075528 字节，用时 0.39Seconds 10423.35Kbytes/sec.
ftp> quit
221 Goodbye.
```

  - The ZMAX-8210 will be forced to reboot.

Warning:

- When upgrading the firmware via FTP, the file name shall be mercury.rmt.
- When upgrading, neither the ZMAX-8210, nor other devices connected to the infrastructure are allowed to be closed.

Backup and Retrieve

It is strongly recommended that you'd better back up some important files in case of something unexpected. If tragedy hits the ZMAX-8210, you have access to restore the important files by the backup. The ZMAX-8210 provides two ways to restore the backup.

- Backup and Retrieve Files via Web ：

```
C:\>ftp 192.168.1.1
Connected to 192.168.1.1
220 (vsFTPd 1.1.3)
User (192.168.1.1:(none)): admin
331 Please specify the password.
Password:
230 Using binary mode to transfer files. Login successful. Have fun.
ftp> get mercury.cfg
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for /mnt/ramd/ mercury.cfg (11411 bytes).
226 File send OK.
ftp: 收到 11411 字节，用时 0.00Seconds 11411000.00Kbytes/sec.
ftp> put zmax8200.cfg
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
ftp: 发送 11411 字节，用时 0.02Seconds 713.19Kbytes/sec.ftp> quit
221 Goodbye.
```

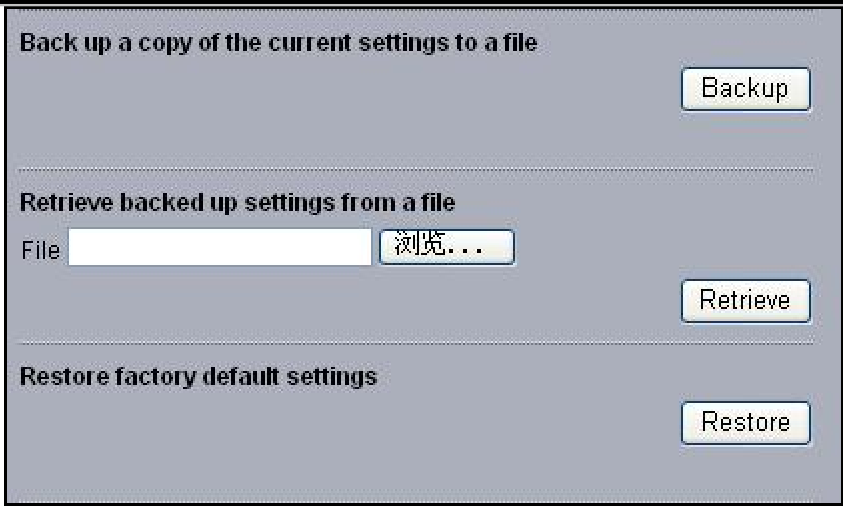


Figure 23 Retrieve and Backup Settings

- From the“Backup / Restore Settings”, by clicking“Backup”, a pop-menu will appear, suggesting you enter:C:\mercury.cfg. After “Confirm”, the mercury.cfg will be saved to your hard disc.
- From the“Backup / Restore Settings”, by clicking“Backup”, a pop-menu will appear, suggesting you enter:C:\mercury.cfg. After “Retrieve”, the zmax8210 will retrieve your backup file.

- Backup and Retrieve Files via FTP：
  - Enter the command ftp 192.168.1.1 admin and password,
  - After successful commanding, enter“get mercury.cfg”. If the upgrade is successful, enter “get mercury.cfg” and you’ll see the information as below. A file will be saved to your PC folder following C:\mercury.cfg；
  - Enter“put mercury.cfg”，the file will be loaded to your ZMAX-8210.

✎ **Note：**

- The file name shall be mercury.cfg.

Restore Factory Default Settings

The ZMAX-8210 provides two ways to restore the default factory settings.

- Restore the factory default settings via web:
  - From the "Restore Factory Default Settings", clicking "Restore" will restore your ZMAX-8210 default settings.
- Restore the factory default settings via "Restore Button".
  - When the ZMAX-8210 power adapter is connected to this device, press "Default Button" for about over10seconds. The "Default Button" is shown as below:

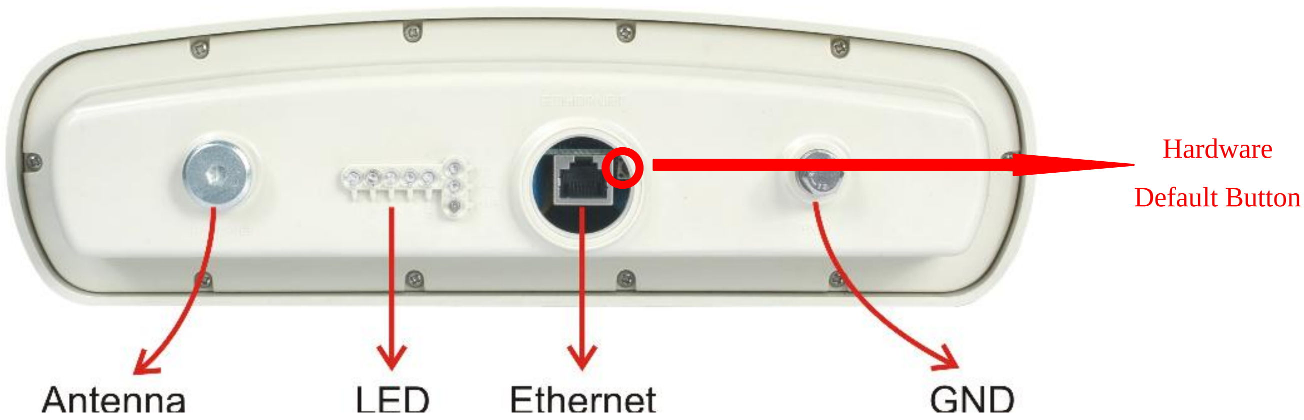


Figure 24 ZMAX-8210 Default Button

Reboot

The ZMAX-8210 supports PoE supply. You can restore web-based management to reboot this CPE. Enabling "Yes" can reboot it.



Figure 25 Reboot

SSH

The ZMAX-8210 provides SSH management. It is recommended that Putty is your right option to access this device's management.

- Open  putty.exe by double clicking Putty
  - Enter 192.168.1.1 in the "Host Name" field and "Protocol".

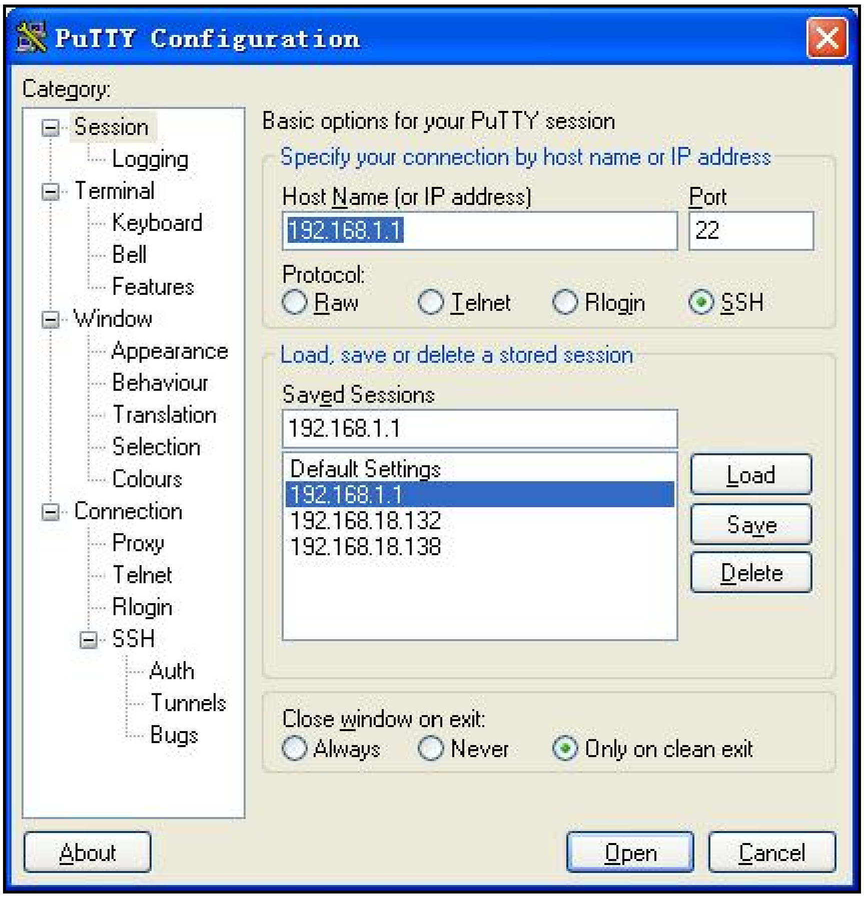


Figure 26 Putty Settings

- From the "Connection", select "SSH"; From the "Preferred SSH protocol version", select"2"; From the "Encryption cipher selection policy", make "3DES" the top position.

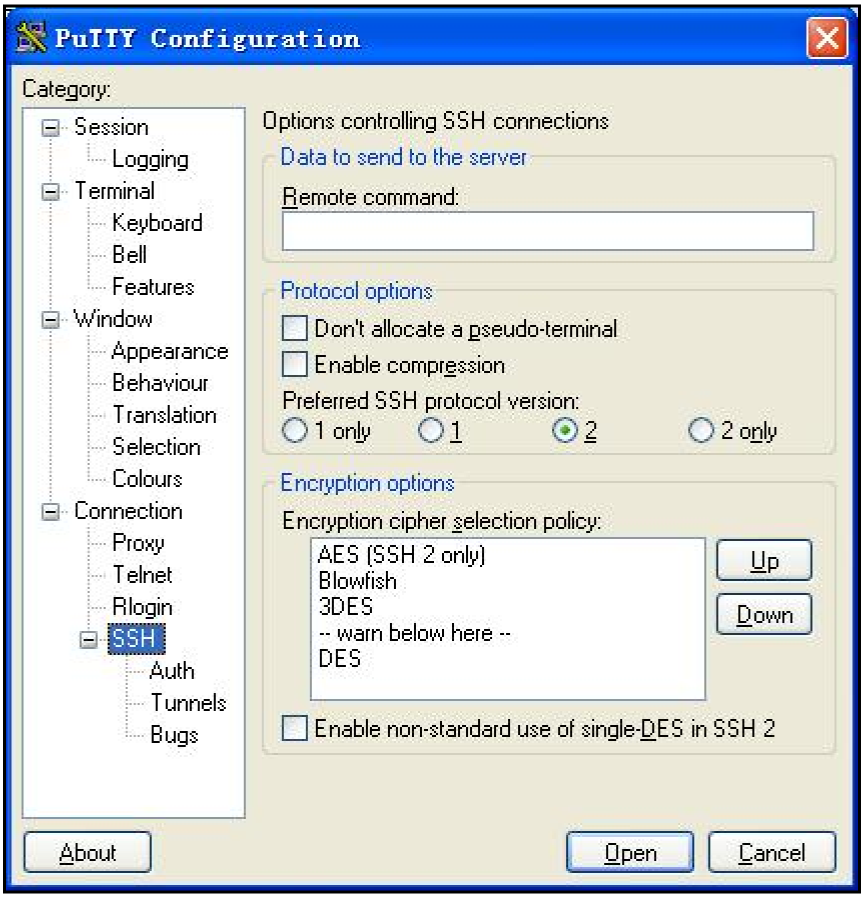


Figure 27 Putty settings 2

- Click Open and a page will open like below:

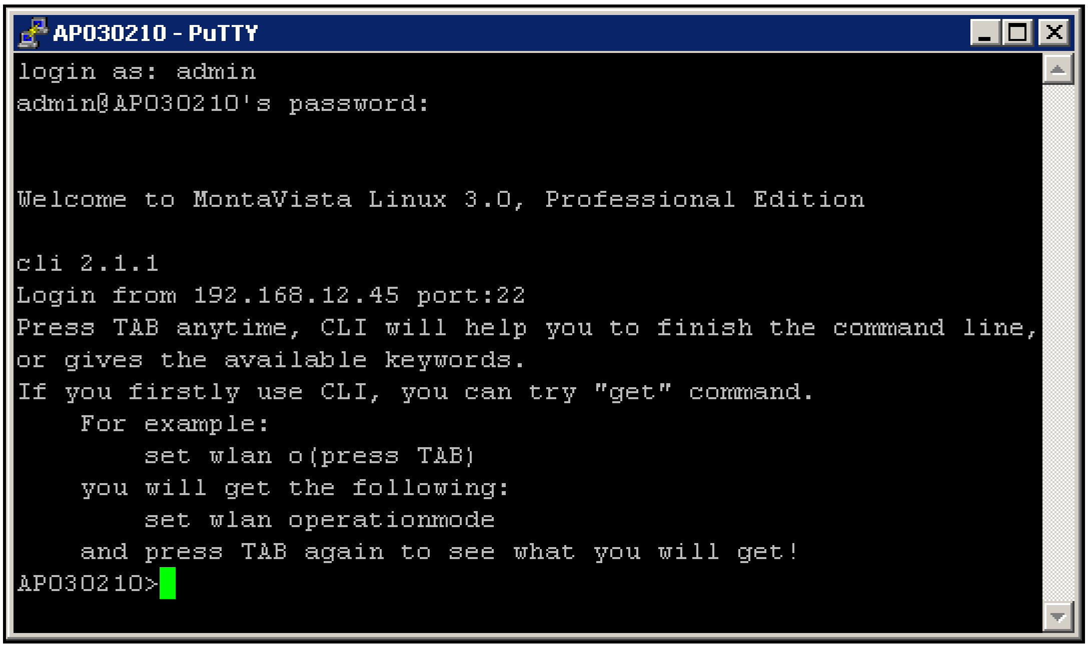


Figure 28 SSH Settings 3

- Enter admin and password in the separate field.
- For help information, enter" help" command.

Chapter 6 Troubleshooting

Frequently Asked Question (FAQ)

Q 1. In what way to get to know the ZMAX-8210 MAC address?

MAC Address distinguishes herself by the distinct identity among networking devices. There are two ways available to know the address.

- In the rear of the ZMAX-8210, posted the MAC Address. Refer below.

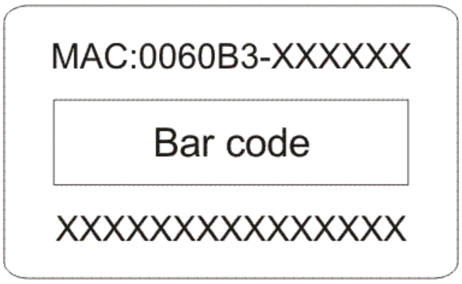


Figure 29 ZMAX-8200 MAC Address

- Through the ZMAX-8210 web-based management, you can view the address from the Basic Information.

Q 2. Why my PC fails to access the internet?

- Make sure your PC IP Address doesn’t clash with others’. If DHCP Server enabled, you have to get your PC to obtain dynamic IP Address. Finally, reboot your PC.
- Make sure the ZMAX-8210 Ethernet connector has taken effect. Or change a cable to connect your device and PC.

Q 3. Why I fail to configure my ZMAX-8210？

- Make sure your device is perfectly connected to the power adapter.
- Make sure your PC IP address is consistent with device Address. For example, your PC IP Address s 192.168.1.X, while your default device’s is 192.168.1.1.
- Restore the factory default settings and re-login your ZMAX-8210 web-based management.

Q 4. In what way to set IP Address for my PC with Windows XP/2000installed？

- Go to Start→Click control Panel→Double-click Network Connections→Right-click Local Area Connection→Click Properties
- Highlight Internet Protocol (TCP/IP) and click Properties.

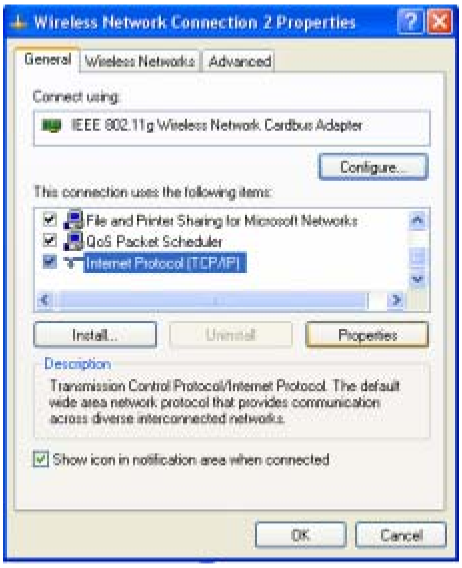


Figure 30 ZMAX-8210 Wireless Network Connection Properties

Q 5. In what way to restore my ZMAX-8210 to the factory default settings?

Refer to **Restore Factory Default Settings.**

Q 6. How to re-gain my ZMAX-8210 password if it slips off my mind？

Refer to **Restore Factory Default Settings.**

Q 7. How I could know my PC has connected to the ZMAX-8210?

- Click“Start” > “Run”
- Enter “cmd”
- Enter “ping 192.168.1.1”, use “ping” to check whether the tie has been established between your ZMAX-8210 and PC
- If the tie has been established, it will be shown as below.

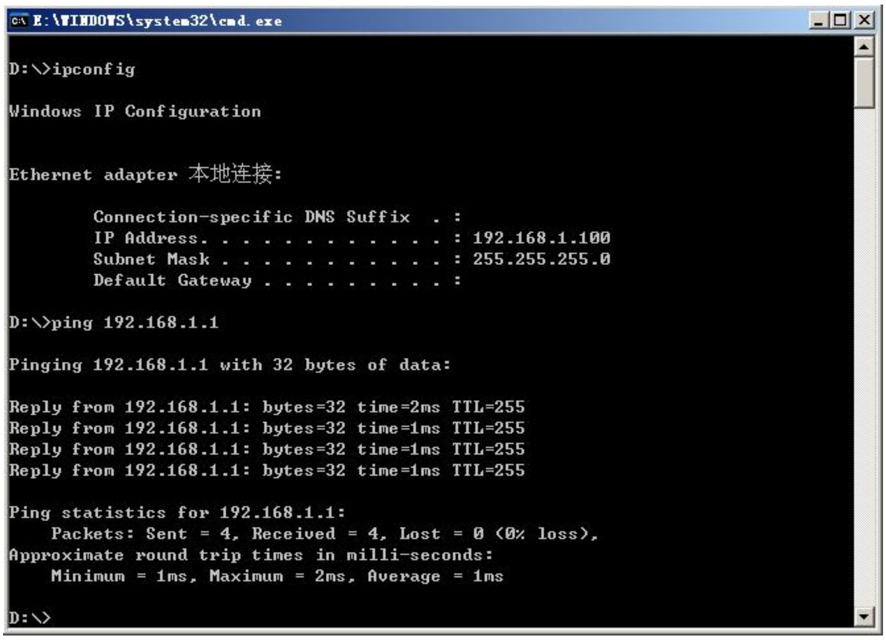


Figure 31 ZMAX-8210 Ping

Appendix A Specifications

This appendix provides technical terms for the ZMAX-8210 CPE.

Table 2 ZMAX-8210-I Spec

802.16d-2004 Outdoor CPE	
	Main Features as follows: ➢ Operates at 3.5GHz ➢ Built-in 16dBi directional panel antenna ➢ Power over Ethernet (PoE, non-802.3af compliant) ➢ Resistant design for outdoor environment (IP65) ➢ SNMP support ➢ RoHS ➢ Signal Status Display by LED Line
Module	**ZMAX-8210-I**
Description	ZMAX-8210-I works at 3.5GHz, compatible with 802.16d-2004 standard, designed as CPE.. ZMAX-8210 benefits from WiMAX technologies with OFDM technology, delivering the best economics and advanced wireless solution for fixed broadband access.
System	
Operation Mode	CPE
IP Router	Yes
NAT	Yes
Access Control	Yes
Flow Control	Yes
DHCP	DHCP Server/DHCP Client
NTP	Yes
HTTP Redirect	Yes
Watchdog	Yes
Features	
QoS	Yes(rtPS/nrtPS/UGS/BE)
Encryption	DES/AES
DFS (Dynamic Frequency Selection)	Yes
ARQ	Yes

(Automatic Repeat Request)		
PHS (Payload Header Suppression)	Yes	
Site Survey	Yes	
Signal Indicators		
Radio		
Standard	IEEE 802.16-2004, HiperMAN/WiMAX Fixed Profile	
Modulation	OFDM modulation, 256FFT points; BPSK, QPSK, 16-QAM, 64-QAM	
RF Frequency	3.4 to 3.6 GHz in steps of 250kHz	
Bandwidth	1.75MHz, 3.5MHz & 7MHz	
Duplexing Method	TDD and HFDD	
Spectral Efficiency	5 bits/sec/Hz (64-QAM uncoded)	
Supported Frame Lengths	2.5,4,5,8,10 & 20 ms	
Tx Maximum output Power (at antenna connector)	20.5dBm	
Tx Center Frequency Tolerance	< ±2% subcarrier spacing	
Symbol Clock Frequency Tolerance	< ±5ppm	
Frequency Control	Automatic Frequency Control (AFC)	
Spectral Mask Requirements	Type-G mask ETSI-EN301021	
Power Control	Automatic Gain Control (AGC), Automatic Link Control (ALC)	
Adjacent Channel Rejection C/I	**16-QAM 3/4**	**64QAM 3/4**
	-11dB	-4dB
Nonadjacent Channel Rejection C/I	**16-QAM 3/4**	**64QAM 3/4**
	-30dB	-23dB
Relative Tx Constellation Error (@20.5dBm output power)	**Burst Type**	**Typical [dB]**
	BPSK 1/2	-31.5
	QPSK 1/2	-31.5
	QPSK 3/4	-31.5
	16QAM 1/2	-31.5
	16QAM 3/4	-31.5
	64QAM 1/2	-31.5
	64QAM 3/4	-31.5
Maximum Rx Receiver Sensitivity (BER <10-6)	**Burst Type**	**Typical [dB]**
	BPSK 1/2	-95.0
	QPSK 1/2	-93.0

	QPSK 3/4	-89.5
	16QAM 1/2	-86.5
	16QAM 3/4	-83.0
	64QAM 1/2	-79.0
	64QAM 3/4	-77.0
Management		
Secure WEB Management	Yes	
SNMP	Yes	
SSH	Yes	
CLI	Yes	
F/W Upgrade	Web/TFTP/FTP	
Interface		
LAN	One 10/100-BaseTX RJ-45 Ethernet Port	
Antenna Type (Built-in)	16dBi pannel antenna	
Default Button	Yes	
Ground Interface	Yes	
Led	1-Power, 1-WLAN, 1-LAN, 5-Signal Indicator	
Physical		
Dimension	277(L)x277(W)x80(H)	
Weight	1.5 Kg	
Power Consumption	10W	
Power Supply	PoE,802.3af compliant, Remote Power 48V@500mA	
Environment		
Operating Temperature	-20~65 ℃	
Operating Humidity	5 ~ 95% Non-Condensing	
Storage Temperature	-40 oC~85 ℃	
Storage Humidity	5 ~ 95% Non-Condensing	
Waterproof	IP65	
RoHS compliant	Yes	
Warranty	12 months	

Table 3 ZMAX-8210-E Spec

802.16d-2004 Outdoor CPE

	Main Features as follows: ➢ Operates at 3.5GHz ➢ Built-in 16dBi directional panel antenna ➢ Power over Ethernet (PoE, non-802.3af compliant) ➢ Resistant design for outdoor environment (IP65) ➢ SNMP support ➢ RoHS ➢ Signal Status Display by LED Line
Module	**ZMAX-8210-E**
Description	ZMAX-8210-E works at 3.5GHz, compatible with 802.16d-2004 standard, designed as CPE.. ZMAX-8210-E benefits from WiMAX technologies with OFDM technology, delivering the best economics and advanced wireless solution for fixed broadband access.
System	
Operation Mode	CPE
IP Router	Yes
NAT	Yes
Access Control	Yes
Flow Control	Yes
DHCP	DHCP Server/DHCP Client
NTP	Yes
HTTP Redirect	Yes
Watchdog	Yes
Features	
QoS	Yes(rtPS/nrtPS/UGS/BE)
Encryption	DES/AES
DFS (Dynamic Frequency Selection)	Yes
ARQ (Automatic Repeat Request)	Yes
PHS (Payload Header Suppression)	Yes
Site Survey	Yes
Signal Indicators	
Radio	
Standard	IEEE 802.16-2004, HiperMAN/WiMAX Fixed Profile

Modulation	OFDM modulation, 256FFT points; BPSK, QPSK, 16-QAM, 64-QAM	
RF Frequency	3.4 to 3.6 GHz in steps of 250kHz	
Bandwidth	1.75MHz, 3.5MHz & 7MHz	
Duplexing Method	TDD and HFDD	
Spectral Efficiency	5 bits/sec/Hz (64-QAM uncoded)	
Supported Frame Lengths	2.5,4,5,8,10 & 20 ms	
Tx Maximum output Power (at antenna connector)	20.5dBm	
Tx Center Frequency Tolerance	< ±2% subcarrier spacing	
Symbol Clock Frequency Tolerance	< ±5ppm	
Frequency Control	Automatic Frequency Control (AFC)	
Spectral Mask Requirements	Type-G mask ETSI-EN301021	
Power Control	Automatic Gain Control (AGC), Automatic Link Control (ALC)	
Adjacent Channel Rejection C/I	**16-QAM 3/4**	**64QAM 3/4**
	-11dB	-4dB
Nonadjacent Channel Rejection C/I	**16-QAM 3/4**	**64QAM 3/4**
	-30dB	-23dB
Relative Tx Constellation Error (@20.5dBm output power)	**Burst Type**	**Typical [dB]**
	BPSK 1/2	-31.5
	QPSK 1/2	-31.5
	QPSK 3/4	-31.5
	16QAM 1/2	-31.5
	16QAM 3/4	-31.5
	64QAM 1/2	-31.5
	64QAM 3/4	-31.5
Maximum Rx Receiver Sensitivity (BER <10-6)	**Burst Type**	**Typical [dB]**
	BPSK 1/2	-95.0
	QPSK 1/2	-93.0
	QPSK 3/4	-89.5
	16QAM 1/2	-86.5
	16QAM 3/4	-83.0
	64QAM 1/2	-79.0
	64QAM 3/4	-77.0
Management		
Secure WEB Management	Yes	

SNMP	Yes
SSH	Yes
CLI	Yes
F/W Upgrade	Web/TFTP/FTP
Interface	
LAN	One 10/100-BaseTX RJ-45 Ethernet Port
Antenna	One N Type (Female) Interface
Default Button	Yes
Ground Interface	Yes
Led	1-Power, 1-WLAN, 1-LAN, 5-Signal Indicator
Physical	
Dimension	277(L)x277(W)x80(H)
Weight	1.5 Kg
Power Consumption	10W
Power Supply	PoE,802.3af compliant, Remote Power 48V@500mA
Environment	
Operating Temperature	-20~65 ℃
Operating Humidity	5 ~ 95% Non-Condensing
Storage Temperature	-40 oC~85 ℃
Storage Humidity	5 ~ 95% Non-Condensing
Waterproof	IP65
RoHS compliant	Yes
Warranty	12 months

Appendix B Technical Terms

Table 4 Technical Terms

Terms	Description
IEEE 802.16	IEEE 802.16 is a wireless networking standard adopted in December, 2001.
BS	BS is the abbreviation of Base Station, a basic component in WiMAX infrastructure.
SS	SS is the abbreviation of Subscriber Station, a user-client in WiMAX infrastructure.
CPE	CPE is the abbreviation of Customer-Premises Equipment, acting as a client.
DHCP、DHCP Client 、 DHCP Server	DHCP, Dynamic Host Configuration Protocol . An Ethernet protocol specifying how a centralized DHCP server can assign network configuration information to multiple DHCP clients. The assigned information includes IP addresses, DNS addresses, and gateway (router) addresses.
IP Address and Network Mask	IP Address is a four-byte number uniquely defining each host on the Internet, usually written in dotted-decimal notation with periods separating the bytes (for example, 134.177.244.57). Ranges of addresses are assigned by Internet, an organization formed for this purpose. Combined with the IP address, the IP Subnet Mask allows a device to know which other addresses are local to it, and which must be reached through a gateway or router.
LAN&WAN	LAN (Local Area Network): A communications network serving users within a limited area, such as one floor of a building. WAN: A long distance link used to extend or connect remotely located local area networks. The Internet is a large WAN.
Router	A device that forwards data between networks. An IP router forwards data based on IP source and destination addresses.
NetBIOS	Network Basic Input Output System. An application programming interface (API) for sharing services and information on local-area networks (LANs). Provides for communication between stations of a network where each station is given a name. These names are alphanumeric names, 16 characters in length.
Encryption	To secure the communication between the wireless device and other devices, encryption is implemented to protect secret against attack.
MAC	The Media Access Control address is a unique 48-bit hardware address assigned to every network interface card.
Ping	Using “ping” command aims at checking the communication between your

	device and other devices.
Web-based Graphical User Interface (GUI)	A web-based management. You have access to the site via Netscape or Microsoft Internet Explorer, monitoring and managing your device.
WINS Server	WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses. If a remote network contains a WINS server, your Windows PCs can gather information from that WINS server about its local hosts. This allows your PCs to browse that remote network using the Windows Network Neighborhood feature.

Appendix C ASCII

WEP can be configured with a 64-bit or 128-bit Shared Key (hexadecimal number or ACSII). As defined, hexadecimal number or ACSII is represented by 0-9, A-F or a-f; likewise, ACSII is represented by 0-9, A-F, or a-f and punctuation. Every can consist of two-digit hexadecimal.

Table 5 ASCII

ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent
!	21	9	39	Q	51	i	69
"	22	:	3A	R	52	j	6A
#	23	;	3B	S	53	k	6B
$	24	<	3C	T	54	l	6C
%	25	=	3D	U	55	m	6D
&	26	>	3E	V	56	n	6E
‘	27	?	3F	W	57	o	6F
(	28	@	40	X	58	p	70
)	29	A	41	Y	59	q	71
*	2A	B	42	Z	5A	r	72
+	2B	C	43	[	5B	s	73
,	2C	D	44	\	5C	t	74
-	2D	E	45	]	5D	u	75
.	2E	F	46	^	5E	v	76
/	2F	G	47	_	5F	w	77
0	30	H	48	`	60	x	78
1	31	I	49	a	61	y	79
2	32	J	4A	b	62	z	7A
3	33	K	4B	c	63	{	7B
4	34	L	4C	d	64	|	7C

5	35	M	4D	e	65	}	7D
6	36	N	4E	f	66	~	7E
7	37	O	4F	g	67		
8	38	P	50	h	68		

Appendix D SSH Settings

Table 6 SSH Settings

get	set	del	keyword				descriptions
√	√		system				--- system setting
√			version				--- system firmware version
√	√		devicename				--- system name
√			macaddr				--- system MAC address
√	√		routemode				--- system route mode
√	√		anyiponroute				---system any ip on route mode
√			time				
√				daylight saving			--- Daylight Saving Time of time server
√				now			--- Time of system
√	√			server			--- Time server of system
√	√			zone			--- Time zone of Time server
√	√		bridge				--- system bridge port
√	√			iptype			--- system dhcp client
√	√			ipaddr			--- system IP address
√	√			netmask			--- system network mask
√	√			gateway			--- system gateway
√	√			dns primary			--- system primary DNS
√	√			dns secondary			--- system secondary DNS
√	√		ethernet				--- system ethernet port
√	√			iptype			--- system dhcp client
√	√			ipaddr			--- system IP address
√	√			netmask			--- system network mask

√	√			gateway			--- system gateway
√	√			dns primary			--- system primary DNS
√	√			dns secondary			--- system secondary DNS
√	√			IP start			--- IP range start
√	√			IP End			--- IP range end
√	√			IP Range Netmask			--- IP range netmask
√	√		wireless				--- system wireless port
√	√			iptype			--- system dhcp client
√	√			ipaddr			--- system IP address
√	√			netmask			--- system network mask
√	√			gateway			--- system gateway
√	√			dns primary			--- system primary DNS
√	√			dns secondary			--- system secondary DNS
√	√			IP start			--- IP range start
√	√			IP End			--- IP range end
√	√			IPRange Netmask			--- IP range netmask
√	√		stp				--- enable spanning tree protocol
√	√		ssh				--- enable remote SSH access
√	√		snmp				--- SNMP setting
√	√			server			--- enable SNMP agent
√	√			trap server			--- SNMP TrapServer IP address
√	√			read community			--- SNMP Readcommunity

√	√			write community			--- SNMP Writecommunity
√	√			description			---SNMP System Description
√	√		wimax				--- wireless setting
√	√			bsid			--- WiMAX Base Station ID
√	√			duplex			--- WiMAX Duplex Mode
√				channel			---wireless Center Frequency
√				cpsize			--- WiMAX CP Size
√	√			bandwidth			--- wireless Band Width
√				framelengh			--- wireless transmit Frame Length
√	√			encryption			--- wireless Encryption Mode
√	√			ir-bit			--- WiMAX wireless parameter
√				status			--- wireless status
	√		password				--- system password
	√		reboot				--- reboot system
	√		exit				--- logout from CLI
	√		quit				--- quit CLI